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<b>14. ABSTRACT</b> Invent Now, a nonprofit organization, planned and implemented the Camp Invention project in Champaign-Urbana with the support of ERDC - Construction Engineering Research Laboratory. The project was focused on underserved children in grades 1-6 who need, but have limited access to, out-of-school time STEM (science, technology, engineering, mathematics) enrichment opportunities. Two one-week programs were implemented during the weeks of June 17 and July 8 at Orpheum Children's Science Museum at Booker T. Washington STEM Academy. The project impacted 115 children and provided professional development for the project's educators in the Urbana-Champaign area.					
<b>15. SUBJECT TERMS</b> STEM: science, technology, engineering, mathematics					
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**Grant Final Report to the U.S. Army Engineer Research and Development Center  
Construction Engineering Research Laboratory  
Camp Invention 2013  
Urbana-Champaign Region**

**Project Summary:**

Invent Now, a nonprofit organization, planned and implemented the Camp Invention project in Champaign-Urbana with the support of the U.S. Army Research and Development Center - Construction Engineering Research Laboratory. The project was focused on underserved children in grades 1-6 who need, but have limited access to, out-of-school time STEM (science, technology, engineering, mathematics) enrichment opportunities. Two one-week programs were implemented during the weeks of June 17 and July 8 at Orpheum Children's Science Museum at Booker T. Washington STEM Academy. The project impacted 115 children and provided professional development for the project's educators in the Urbana-Champaign area.

**Proposal and Result Comparison:**

The project was implemented following the proposed plan; it was not necessary to make changes in location, dates of implementation, curricula, budget, or personnel. John Mudrick, GOTR for the project, conducted a site visit of the project.

**Camp Invention program sites that received support from the U.S. Army Engineer Research and Development Center-Construction Engineering Research Laboratory:**

Program Code	Host Site	City	Program Date	Program Curricula
C-IL14-01455-13	Orpheum Children's Science Museum at Booker T. Washington STEM Academy	Urbana	6/17/2013	Geo-Quest
C-IL14-01471-13	Orpheum Children's Science Museum at Booker T. Washington STEM Academy	Urbana	7/8/2013	Spark

**Demographics:**

Demographic information is gathered from participants on a strictly optional basis. The following responses reflect the reported demographics for Urbana-Champaign area:

Male	56%	Female	44%		
African American	21%	Asian/Pacific Islander	17%	Hispanic	8%
Native American	2%	Caucasian	48%	Multiracial/Other	4%
Physically Challenged	.05%	Developmentally Challenged	1.6%		

**Program Curricula:**

Camp Invention's newly-piloted "Geo-Quest" program was implemented during the week of June 16. The program's modules included: *I Can Invent: Launchitude™*, *Cache Dash™*, *EcoVerse™*, *Amazing Atlas™*, and *Geo-Games™*. In this program, participants:

- Used 21st century skills, logical and critical thinking, communication and collaboration, and global and cultural awareness to solve invention-based challenges through geography-based experiences;
- Designed scientific explorations to investigate geology, chemical properties, trajectory, velocity, and gravity through open-ended inquiry-based challenges;
- Applied reverse engineering and engineering design principles to create prototypes and working inventions like seismometers, heat resistant devices, and paleontological tools; and
- Employed math skills to navigate using triangulation and latitude and longitude lines, and explore scale through global trekking challenges.

During the week of July 8, the “Spark” program was implemented and included the following modules: *Bounce! An Atomic Journey™*, *The Curious Cypher Club™*, *I Can Invent: Launchitude™*, *Geo-Games™*, and *WILD! Wondrous Innovations and Living Designs™*. In this program, the children:

- Created, tested, and re-created an invention, allowing them to experience trial and error discoveries, while employing scientific principles including trajectory science and physics;
- Explored the science behind bouncy balls, giving children a hands-on understanding of matter: solid, liquid and gas, as well as atoms, molecules, mixtures, compounds, and polymers;
- Explored nature as inspiration for innovation, and introduces children to the field of bioengineering and biomimicry through hands-on activities; and
- Received Introduction to historical and mathematical codes as well as engineering principles and use teamwork skills to solve all given challenges and practice the 21<sup>st</sup> century skills of collaboration, creativity and divergent/convergent thinking.

#### Camp Invention Outcomes:

Children’s Camp Invention experience generated:

- Creative and inventive thinking
- Critical thinking and creative problem solving
- Self-direction
- Risk-taking and entrepreneurial mindset
- Teaming and collaboration skills
- Wonder and curiosity about STEM
- Excitement, interest, and motivation to learn about the natural and physical world
- Understanding of and connections among STEM knowledge and skills

In addition, the program:

- helped combat summer slide by engaging children in a STEM-based program designed to develop creative and inventive thinking and aligned with State and National Education Standards
- is proven to increase children’s creativity and invention skills

Teachers’ Camp Inventions experience:

- Excites teachers about teaching science
- Increases teachers' interest in STEM
- Gives teachers experience using scientific inquiry and engineering design in teaching
- Provides professional development for teachers and hands-on application of the training during Camp Invention
- Impacts classroom instruction as teachers report that they integrate Camp Invention's teaching approach into their regular school year teaching
- Allows them to see students' progress and engagement in a different setting

### **2013 Surveys:**

In the last few years, Invent Now instituted an online system to collect surveys from parents/children, teachers, counselors and director/assistant directors. This process allows us to individually capture and analyze feedback for each individual program or collectively. The surveys are designed to measure the key results of the program objectives, gauge individual student and teacher reactions to the program and assist in the design and revision of curriculum. In order to optimize the number of respondents, paper survey were distributed to families for the both the June 16 and July 8 programs in Urbana-Champaign. The responses follow:

#### **PARENT RESPONSES:**

##### **OVERALL, did your child enjoy the Camp Invention program?**

Enjoyed a lot: 72.3%

Enjoyed somewhat: 27.7%

Didn't enjoy: 0

Comments:

- Loved the different explorations of science.
- He loves the creative process.
- He thought it was really fun, and he enjoyed the different activities.
- She thinks making something is creative; she likes it very much.
- He said he enjoyed it all!
- I was a bit apprehensive before the week—but my children enjoyed the week a lot, especially the 8-year-old.
- My son is somewhat introverted and creative. I couldn't get him to stop talking about the camp!
- This is Abby's 4<sup>th</sup> year and she LOVED every year, but was less enthusiastic this year. Perhaps due to some behavior issues in her group.
- He enjoyed the games played, but wasn't able to accurately tell about each day.
- The idea of inventing things for a certain situation was interesting and fun.
- Great combination of game-like project + learning new things.
- My daughter loved looking at science in a new way through a variety of each day's activities.

##### **Did your child's Camp Invention experience help him or her to be a better problem solver?**

Definitely: 39.0%

Somewhat: 44.4%

Not much: 0%

Not at all: 0%

I don't know: 16.6%

**OVERALL, how would YOU, as a parent rate your child's Camp Invention experience this week?**

- He was challenged in a fun yet academic way.
- My son enjoyed himself and was excited to learn new ways of doing things, thinking out of the box.
- I like that it piques my child's interest in science.
- The teachers seemed quite good.
- Counselors were excellent, creative curriculum.
- Well put together from a parents' standpoint; enjoyable and educational for student.
- She got to make friends and worked with them to make new devices.
- He enjoyed it much more this year than last.
- Gave my child something to do, and create possible inventions for realistic situations.
- He especially loved the crystal and take apart projects.

**How likely are you to send your child to Camp Invention next year?**

- Great experience! And he's probably having experiences that he wouldn't get at his regular school.
- Because it is education and having fun.
- I want to continue to expose him to exciting things in science.
- She had a lot of fun inventing things.
- As long as he enjoys it and wants to go, I will send him.
- My child was enthusiastic about her experience!
- It depends upon the content of the camp and if it's different than this year.
- After trying several other camps this Summer, this was her favorite.

**Please add any additional comments:**

- Great hands-on science.
- Interested in middle school program.
- Wish this had existed for older child. For future, we're interested in middle school program.
- My daughter has gotten SO much out of this camp in her 4 years. Thank you so much! Her younger brother can't wait to attend next year!

**INSTRUCTORS:**

**How would you rate the participants' enjoyment of the Camp Invention program this week? Please explain why or why not:**

- Yes, about half of the kids were repeat campers. I think this shows how effective the experience can be.

**LEADERSHIP INTERNS/COUNSELORS:**

**Did the Camp Invention experience help you to learn more about the kind of work you would like to do?**

- I do enjoy education and would like to continue working with kids but maybe I should reevaluate the level I'm considering.
- I learned how to effectively speak to large groups of younger children.
- I learned I am very patient with children when others are not. However I learned I would not want to be responsible for such a large group for an extended time and therefore would probably not want to be an elementary school teacher.